KUS700 Dual Probe Ultrasonic Sensor

Introduction

This ultrasonic sensor is capable of providing extremely high distance measurement accuracy, ensuring the reliability of the measurement results and having extremely small blind spots. It can perform accurate measurements within a close range and is suitable for various complex environments.

It can not only output accurate distance values, but also output temperature values in real time, making it convenient for users to conduct comprehensive analysis and has a fast response speed.

The ultrasonic dual-probe distance sensor has the common 485 output method on the market. The sensor has built-in digital quantity as a way to read data and configure internal parameters, which can be modified through the ModBus-RTU protocol.

Features

•24VDC, with reverse polarity protection, can effectively solve the problem of unstable power supply.
•High precision, small blind area, distance sensor, output distance value, temperature value, fast response speed.
•Some variables can be modified through ModBus-RTU protocol.
•Equipped with RS485 communication, data can be read.
•Protection level: IP68.

Specification

Item	Specification
Range	50-2000mm
Blind Zone	0-50mm
Frequency	100kHz
Emission angle	11.7°
Power Supply	24VDC±10%, reverse polarity protection
Start delay	＜300ms
Output	RS485 (Modbus-RTU)
Rated operating current	≤100mA, short circuit/overload protection
Resolution	0.5mm
Repeatability	±0.25%
Accuracy	±0.5%
Working temperature	-20～60℃
Storage temperature	-40～80℃
Protection level	IP68
Weight	<300g (excluding wire)
Material	ABS
Standard	GB/T 14048.10-2016 GB/T 14048.19-2013

Wring

Brown: 24V+, Blue: GND, Gray: RS485A, Pink: RS485B

Output Settings

The sensor has a built-in 485 interface chip, which is the standard output type of the product and uses the standard Modbus-RTU protocol. It can read the corresponding measurement data and also configure some parameters of the sensor.

Example:
01 03 00 00 00 01 84 0A, read distance value;
01 03 00 02 00 01 25 CA, read temperature value;
Comprehensive command: 01 03 00 00 00 02 C4 0B
Reply: 01 03 04 03 20 08 66 7C 57
03 20 Distance value: 800mm
08 66 Temperature value: 21.50℃

Communication Protocol

1. Serial port parameters

1.1 The hardware uses RS-485, master-slave half-duplex communication, the master calls the slave address, and the slave responds to the communication;
1.2 Data frame 10 bits, 1 start bit, 8 data bits, 1 stop bit, no check;
Baud rate: 9600 19200 115200 (default is 115200).

2. Read single register

Function code: 03H

Host sends							
1	2	3	4	5	6	7	8
ADDR	03H	Starting register high byte	Starting register low byte	Register quantity high byte	Register quantity low byte	CRC code low byte	CRC code high byte

1st byte ADDR: slave address code (0x01~0xFE);
2nd byte 03H: function code;
3rd and 4th bytes: register address to be read;
5th and 6th bytes: number of registers to be read, reading a single register is 0x0001;
7th and 8th bytes: CRC16 checksum from byte 1 to byte 6.

Slave reply						
1	2	3	4	5	6	7
ADDR	03H	Total bytes	Register quantity high byte	Register quantity low byte	CRC code low byte	CRC code high byte

1st byte ADDR: slave address code (0x01~0xFE);
2nd byte 03H: function code;
3rd byte: total number of data bytes received. If a single register is read, total number of bytes is 02;
4th and 5th bytes: register data, each data occupies 2 bytes;
6th and 7th bytes: CRC16 checksum from byte 1 to byte 5.

3. Read multiple registers

Function code: 03H

Host sends							
1	2	3	4	5	6	7	8
ADDR	03H	Starting register high byte	Starting register low byte	Register quantity high byte	Register quantity low byte	CRC code low byte	CRC code high byte

Refer to the method of reading a single register. When reading distance and temperature at the same time, the number of registers is 0x0002

Slave reply									
1	2	3	4,5		...	N-1,N		N+1	N+2
ADDR	03H	Total bytes	Data 1 high byte	Data 1 low byte	...	Data N high byte	Data N low byte	CRC code low byte	CRC code high byte

Refer to the method of reading a single register. Data 1 is the starting register value to be read. Each data occupies 2 bytes. The number of data returned depends on the number of registers read by user.

4. Write single register

Function code: 06H

Host sends							
1	2	3	4	5	6	7	8
ADDR	06H	Register address high byte	Register address low byte	Data high byte	Data low byte	CRC code low byte	CRC code high byte

1st byte ADDR: slave address code (0x01~0xFE);

2nd byte 06H: function code;

3rd and 4th bytes: the register address written;

5th and 6th bytes: the register data corresponding to the register address;

7th and 8th bytes: CRC16 checksum from byte 1 to byte 6.

Slave reply							
1	2	3	4	5	6	7	8
ADDR	06H	Register high byte	Register low byte	Data high byte	Data low byte	CRC code low byte	CRC code high byte

1st byte ADDR: slave address code (0x01~0xFE);

2nd byte 06H: function code;

3rd and 4th bytes: the register address written;

5th and 6th bytes: the register data corresponding to the register address;

7th and 8th bytes: CRC16 checksum from byte 1 to byte 6.

5. Return error code

1	2	3	4	5
ADDR	Function code	Error information code	CRC code low byte	CRC code high byte

1st byte ADDR: slave address code (0x01~0xFE);

2nd byte 83H or 86H: function code (83H indicates read command error, 86H indicates write command error);

3rd byte: refer to error information code table;

4th and 5th bytes: CRC16 checksum from byte 1 to byte 3.

Error Information Code	
Code	**Remark**
01H	Illegal function code
02H	Illegal data address
03H	Illegal data value
04H	CRC16 check error
05H	Received correctly
06H	Received incorrectly
07H	Parameter error

6. Register Definition

Register Address	Function	Read/Write	Remark
0x0000	Distance value (unit: 0.1mm)	RO	2 bytes, high byte first
0x0001	Temperature value	RO	2 bytes, high byte first
0x0002	Distance value (0 for single channel)	RO	2 bytes, high byte first
0x0003	Temperature value	RO	
0x0004	Analog output current value/voltage value	R/W	2 bytes, high byte first
0x0007	Communication address	R/W	0x0001 (default address: 01, broadcast address: 00)
0x0008	Communication baud rate	R/W	0x0004 (default baud rate: 115200bps)

7. Samples

Ultrasonic Distance Sensor			
Instructions	**Send**	**Receive**	Notes
Read instructions	01 03 00 00 00 01 84 0A	01 03 02 07 D0 BB E8	Distance value: 2000mm
	01 03 00 01 00 01 D5 CA	01 03 02 0B 31 7E A0	Temperature value: 28.65℃
	01 03 00 00 00 02 C4 0B	01 03 04 07 D0 0B 31 3C 5A	Read distance and temperature at the same time
	00 03 00 07 00 01 34 1A	01 03 02 00 01 79 84	Broadcast address 00 can read the current communication address
	01 03 00 07 00 01 35 CB	01 03 02 00 01 79 84	Current instrument address: 01
	01 03 00 05 00 01 94 0B	01 03 02 0B B8 BF 06	Current range: 3000mm
	01 03 00 06 00 01 64 0B	01 03 02 00 01 79 84	Currently in distance mode
	01 03 00 08 00 01 05 C8	01 03 02 00 03 F8 45	Current baud rate is 19200
Write instructions	01 06 00 05 09 C4 9E 08	01 06 00 05 09 C4 9E 08	Instrument range changed to 2500mm
	01 06 00 06 00 00 69 CB	01 06 00 06 00 00 69 CB	Measurement mode changed to level mode
	00 06 00 07 00 02 B8 1B	00 06 00 07 00 02 B8 1B	Change the communication address to 02 through broadcast address 00

	01 06 00 07 00 02 B9 CA	01 06 00 07 00 02 B9 CA	Known that the current instrument address is 01, change it to 02
	01 06 00 08 00 02 89 C9	01 06 00 08 00 02 89 C9	Baud rate changed to 9600
	01 06 00 09 00 01 98 08	01 06 00 09 00 01 98 08	System reset
Error instructions	01 03 00 0C 00 01 44 09	01 83 02 C0 F1	02 indicates error message code: illegal data address